

City of Norfolk Coastal Storm Risk Management Study

Executive Summary

A public meeting for the Norfolk Coastal Storm Risk Management (CSRM) Study is scheduled for June 8 at the Lambert's Point Community Center. The purpose of that public meeting is to promote transparency by presenting the options under consideration and soliciting public feedback.

This study was authorized by Resolution of the Senate Committee on Environment and Public Works dated July 25, 2012. The Norfolk CSRM was identified as a focus area within the North Atlantic Coast Comprehensive Study (NACCS) and was funded in the USACE 2016 Work Plan.

The Norfolk CSRM is a comprehensive study to promote resiliency and reduce the risk of coastal storm damage. It encompasses the entire city of Norfolk and is currently scoped at 3 years and \$3 Million. The study cost is split with the funding 50% federal and 50% non-federal. Since the signing of the Feasibility Cost Share Agreement (FCSA) in February 2016, the team has been working to identify available information and develop an array of alternatives. Decisions have been made on appropriate data sets and models to use for the analysis. Existing and future without project (FWOP) conditions have been defined and a structural database of ~63,000 structures have been developed.

The feasibility study is considering potential structural and non-structural solution sets. The recommended plan will be a layered solution that may include elements that would be executed by the non-Federal sponsor, other Federal agencies, Commonwealth of Virginia or one of its agencies, and/or non-governmental organizations in addition to recommendations for implementation by USACE. The future conditions used for analysis are based on the intermediate USACE forecast for sea level rise as well as land subsidence. The benefits are quantified using damages prevented by the project over the 50 year period of analysis. These benefits are compared to the total project cost in a Benefit Cost Ratio (BCR). The National Economic Development (NED) plan will be based on the plan that most reasonably maximizes net economic benefits.

The study is approaching the Tentatively Selected Plan (TSP) milestone in August 2017. At that meeting, the team will recommend a plan to USACE leadership for permission to move forward with further detailed analysis and review of the study report. The review will include public, agency, external and policy analysis. Other important stakeholders on this project include the US Navy, US Coast Guard, US EPA and agencies of the Commonwealth of Virginia.

CITY OF NORFOLK COASTAL STORM RISK MANAGEMENT STUDY



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PURPOSE



To inform the City Council of the current status of the Norfolk Coastal Storm Risk Management study in preparation for the public meeting scheduled for 8 June at the Lambert's Point Community Center.



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NORFOLK COASTAL STORM RISK MANAGEMENT (CSRM) STUDY

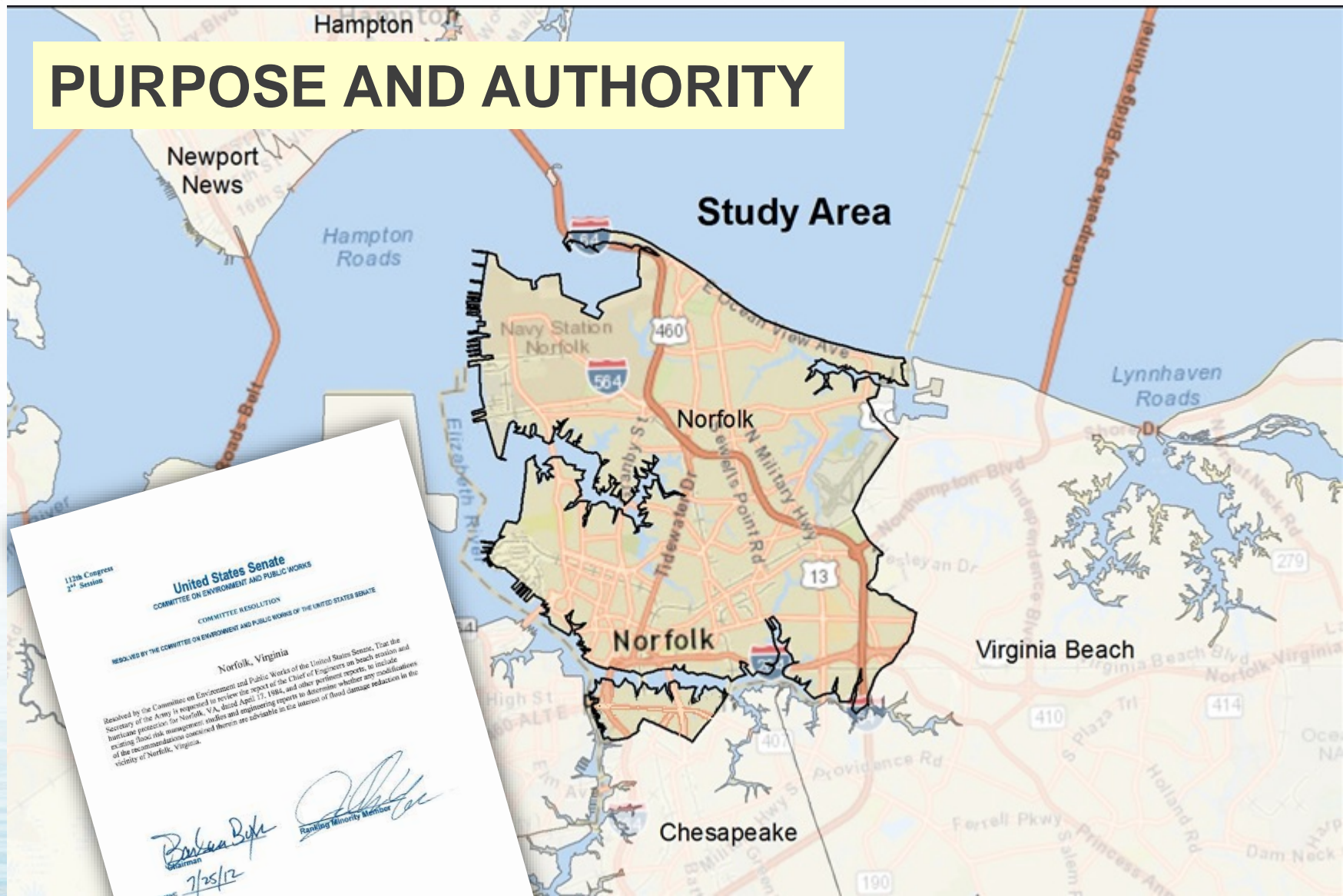
- Partnership between City of Norfolk and USACE
- Study currently scoped at 3 years and \$3 Million
- Stakeholders on team: US Navy, US Coast Guard
- Goal: Congressional Authorization of a project as well as eventual appropriations for project construction (65% Federal, 35% Nonfederal)
- DRAFT measures will continue to be refined and adjusted
- There is not yet a recommended plan
- Environmental Impact Statement will be prepared with US Navy and US EPA as Cooperating Agencies



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PURPOSE AND AUTHORITY



112th Congress
2nd Session

United States Senate
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
COMMITTEE RESOLUTION

RESOLVED BY THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS OF THE UNITED STATES SENATE
Norfolk, Virginia

Resolved by the Committee on Environment and Public Works of the United States Senate, That the Secretary of the Army is requested to review the report of the Chief of Engineers on beach erosion and hurricane protection for Norfolk, VA, dated April 17, 1986, and other pertinent reports, to include existing flood risk management studies and engineering reports to determine whether any modifications of the recommendations contained therein are advisable in the interest of flood damage reduction in the vicinity of Norfolk, Virginia.

Barbara Byrnes
Chairman
7/25/12
Franklin D. Johnson
Ranking Member



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STUDY OVERVIEW

Norfolk has been identified as one of nine areas of high risk by the North Atlantic Coast Comprehensive Study (NACCS)

50 year period of analysis

Sea level rise and land subsidence are considered

Benefit cost ratio is used for plan selection

Benefits are based on damages prevented (generally structural damages)

Costs will include construction, mitigation, operation & maintenance, and real estate

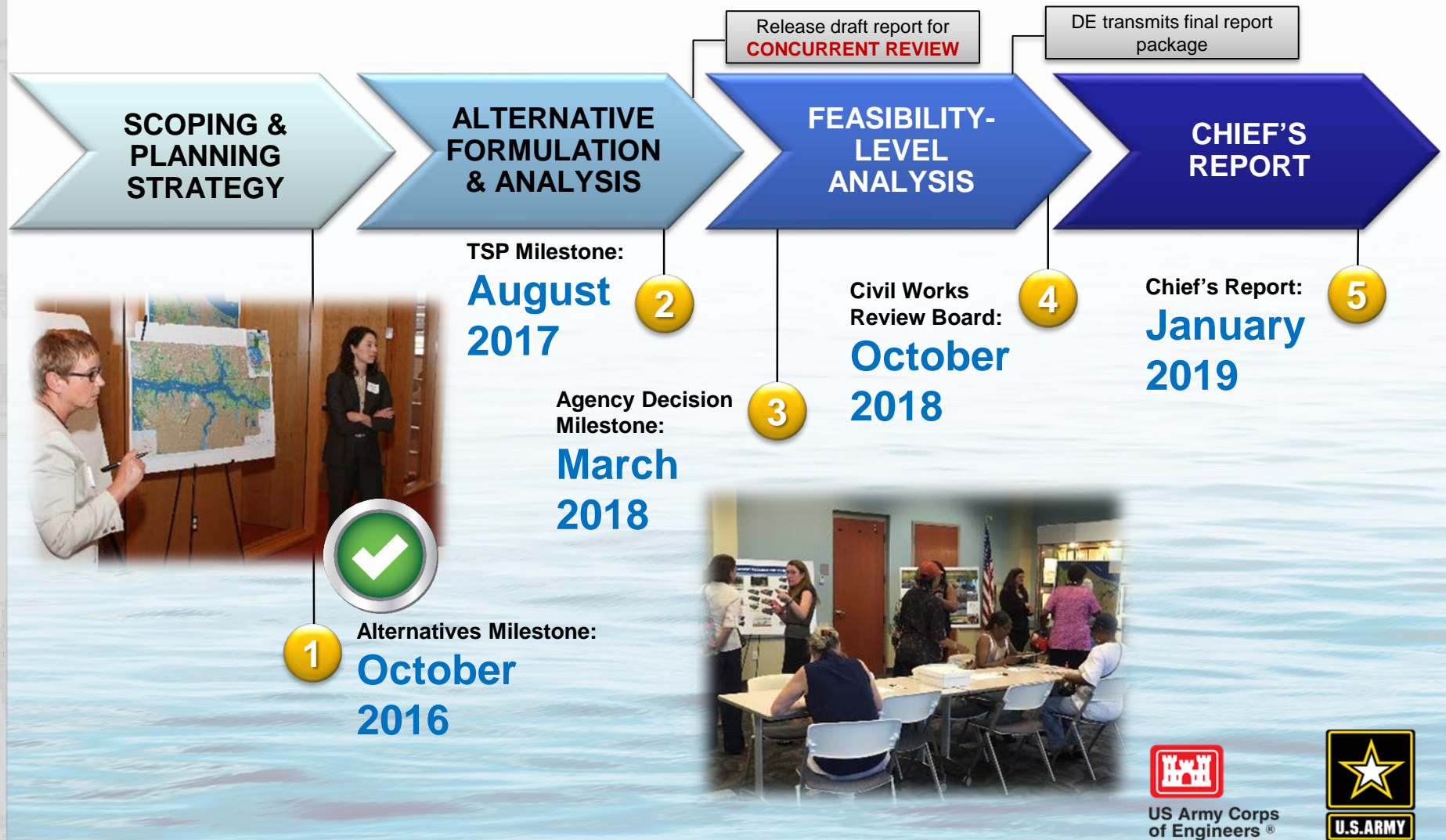


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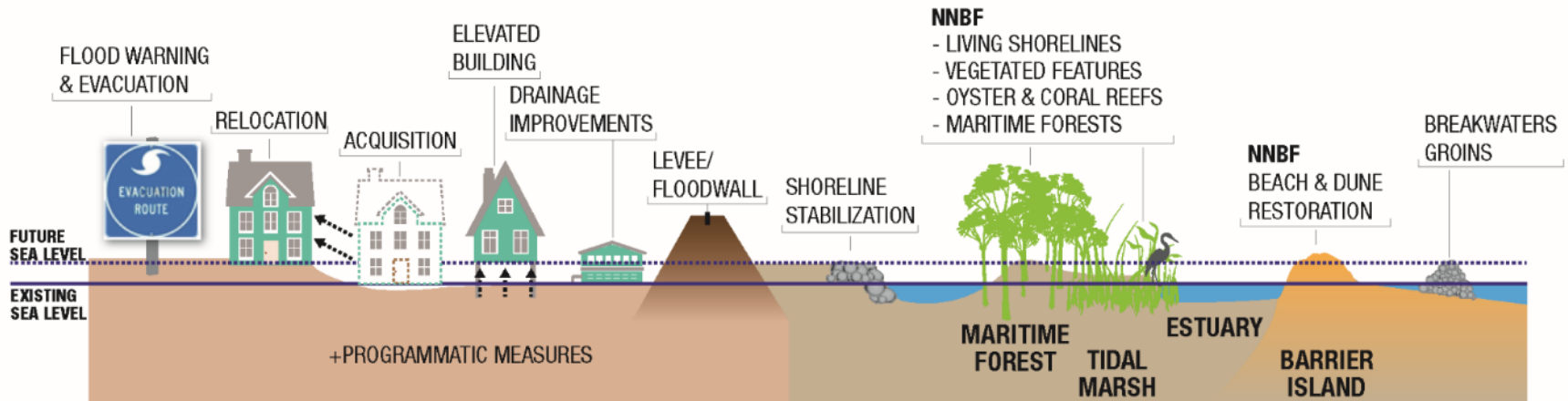


SMART Feasibility Study Process: City of Norfolk CSRM Study

Up to 36 Months



PLAN FORMULATION: MANAGEMENT MEASURES



NONSTRUCTURAL MEASURES CONSIDERED:

- Enhanced Flood Warning, Preparedness, and Evacuation Planning
- Acquisition and Relocation
- Elevation
- Building Retrofit/Floodproofing
- Land Use Management and Floodplain Regulation
- Flood Insurance

STRUCTURAL MEASURES CONSIDERED:

- Floodwalls and Levees
- Deployable Floodwalls
- Shoreline Stabilization
- Storm Surge Barriers
- Beach Restoration
- Groins
- Breakwaters



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POTENTIAL STRUCTURAL MEASURES



***Measures under consideration. Subject to public feedback.**



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POTENTIAL NONSTRUCTURAL MEASURES



***Measures under consideration. Subject to public feedback.**



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PRETTY LAKE

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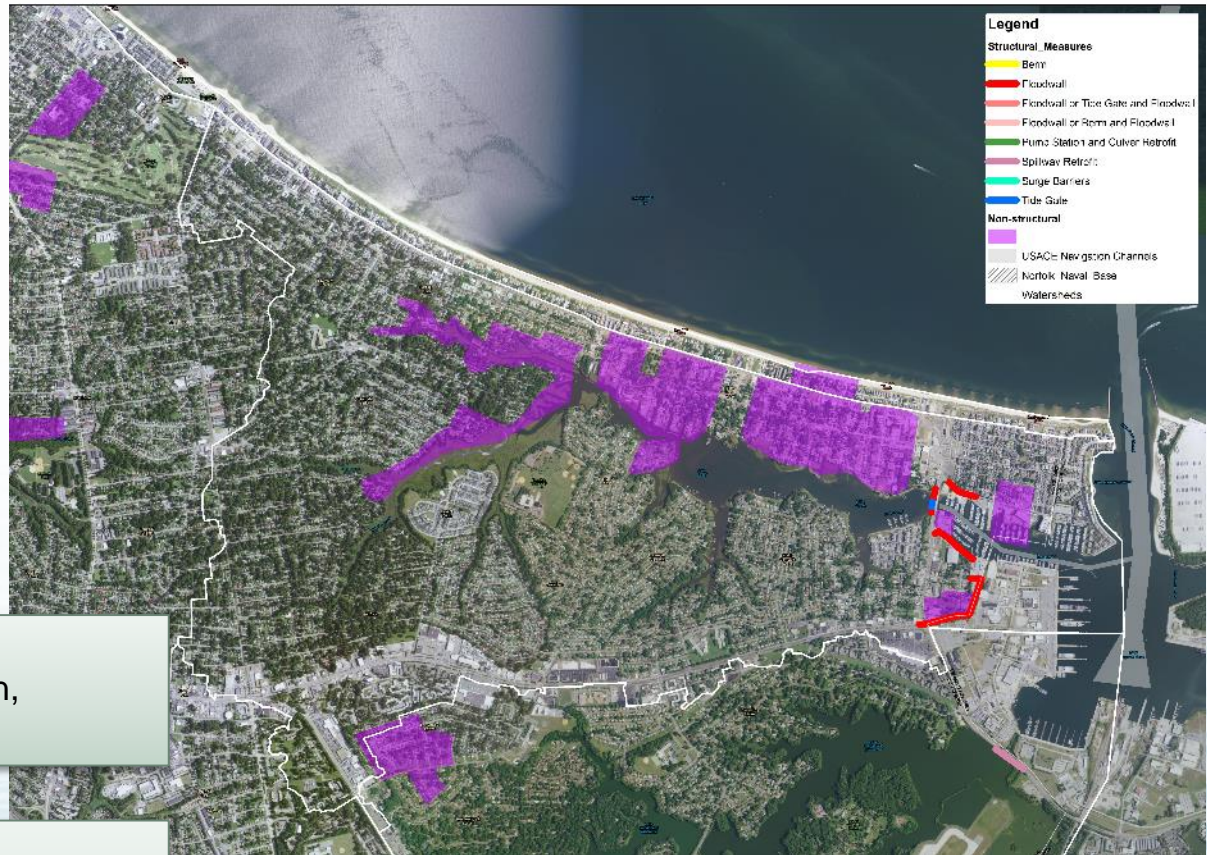


NONSTRUCTURAL

- Real estate raising, acquisition, and/or relocation.

STRUCTURAL

- Storm surge barrier with miter gates at the Shore Drive bridge at Pretty Lake. A pump station may be required in order to evacuate interior drainage. The measure will include north and south flanking floodwalls that will tie into high ground.



***Measures under consideration. Subject to public feedback.**



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LAKE WHITEHURST

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NONSTRUCTURAL

- Real estate raising, acquisition, and/or relocation

STRUCTURAL

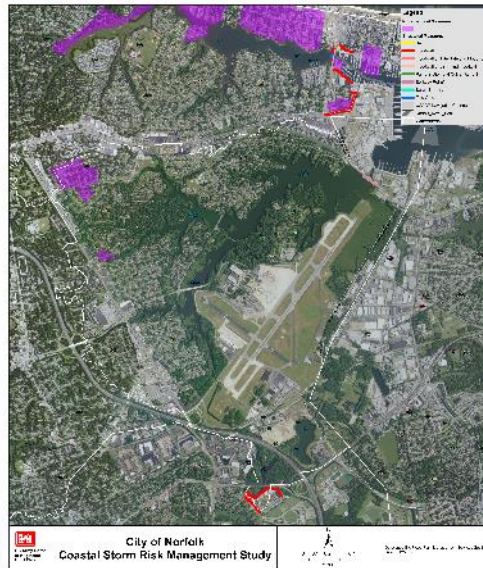
- Raising the reservoir spillway and dam to prevent salt water intrusion into the lake. Pump station may be required to prevent induced flooding caused by a higher spillway.



***Measures under consideration. Subject to public feedback.**

MOORES BRIDGES WATER TREATMENT PLANT

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NONSTRUCTURAL

- Measure designed to protect the Bridges Water Treatment Plant. Protection would include a floodwall adjacent to the plant tying into high ground.

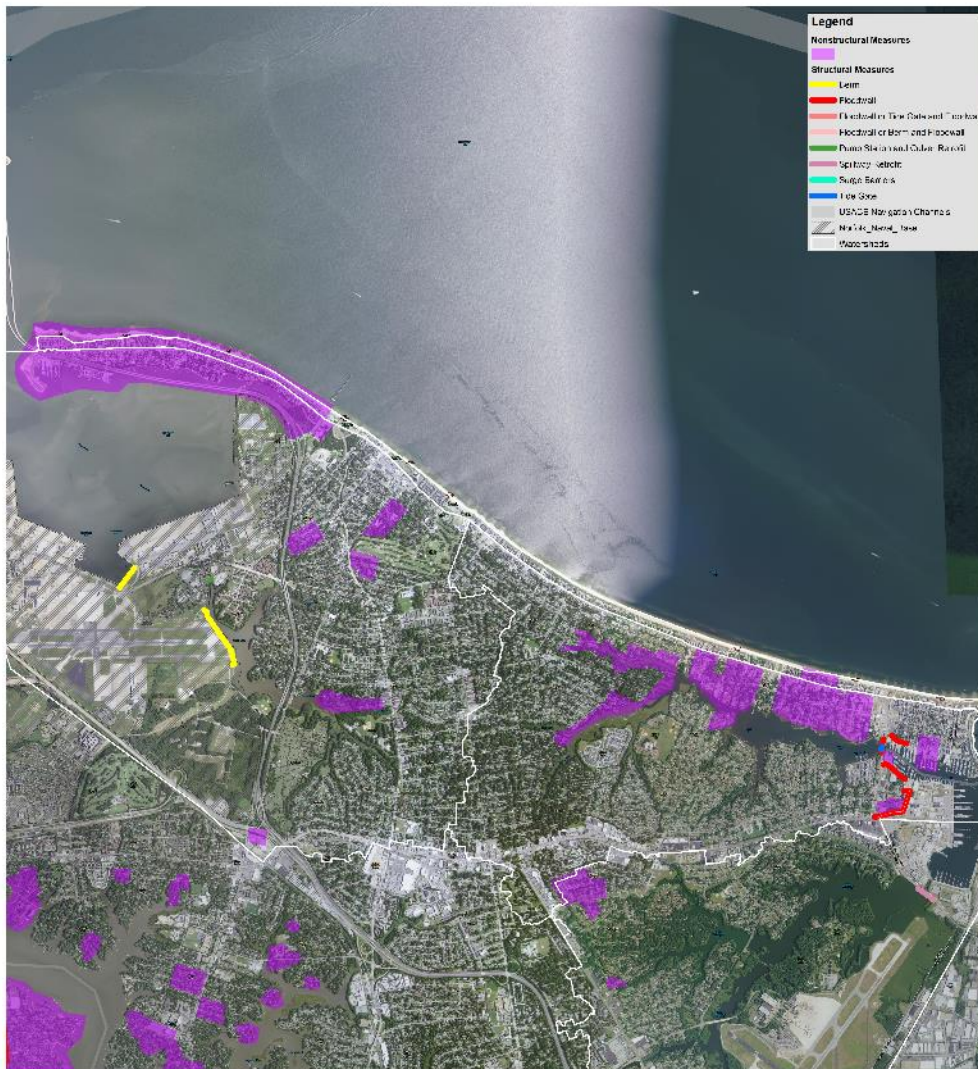


***Measures under consideration. Subject to public feedback.**

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OCEAN VIEW AND WILLOUGHBY BEACH DUNES



NONSTRUCTURAL

- Real estate raising, acquisition, and/or relocation.

STRUCTURAL

- Beach dune construction from the Little Creek inlet to the western end of Willoughby Spit.



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Coastal Storm Risk Management Study



Developed by: Environmental Management Services Group
Date: 6/22/17



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***Measures under consideration. Subject to public feedback.**

MASON CREEK

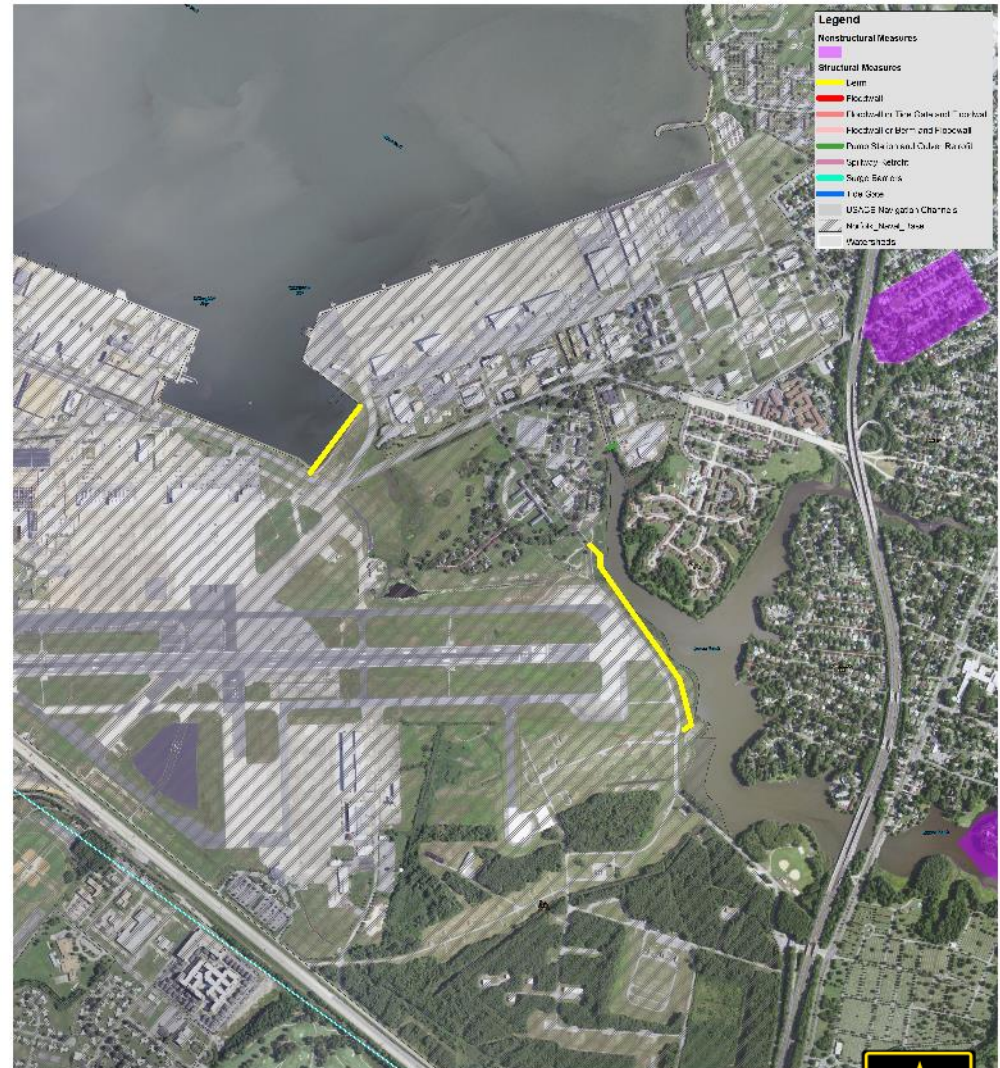


NONSTRUCTURAL

- The measure includes real estate raising, acquisition, and relocation.

STRUCTURAL

- Pump station to evacuate interior drainage in the Mason Creek watershed that will be backed up from the closing of the NAS tide gate. A berm or floodwall would also be required to prevent floodwaters from passing over NAS and into Mason Creek.



City of Norfolk
Coastal Storm Risk Management Study



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***Measures under consideration. Subject to public feedback.**

LAFAYETTE RIVER STORM SURGE BARRIER (1 OF 3)

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NONSTRUCTURAL

- The measure includes real estate raising, acquisition, and relocation.

STRUCTURAL

- Three storm surge barrier alignment options are proposed for the Lafayette River. The storm surge barriers would include miter gates for typical ebb and flow and a sector gate for navigation along the federal navigation channel.
- **Outermost Barrier** would connect Norfolk International Terminal (NIT) with Lambert's Point.
- **Middle Barrier** would connect NIT with the Larchmont neighborhood and a floodwall would extend down the Larchmont coast to Lambert's Point.
- **Innermost Barrier** would be located along Hampton Boulevard and the Hampton Boulevard bridge.

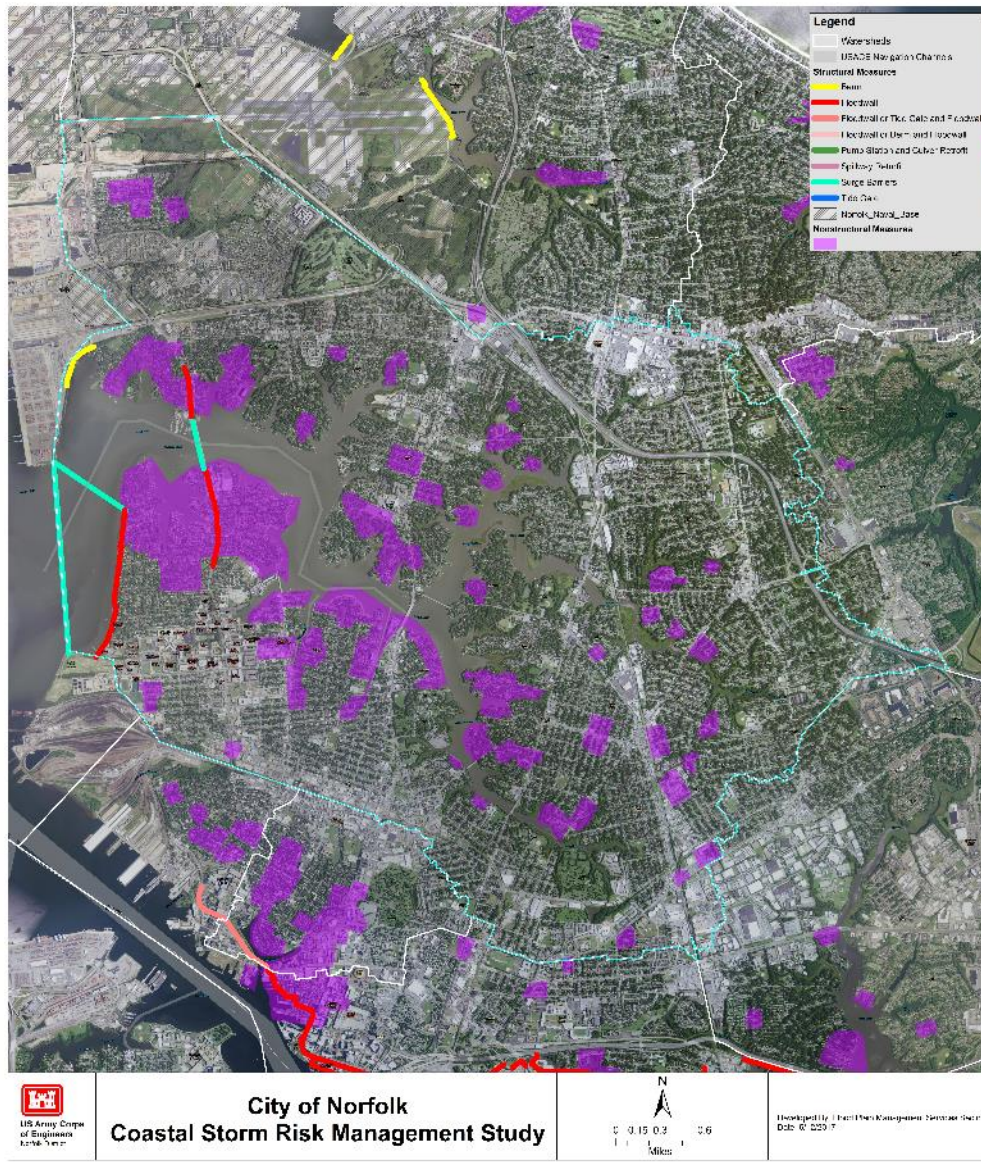


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***Measures under consideration. Subject to public feedback.**

LAFAYETTE RIVER STORM SURGE BARRIER (2 OF 3)



***Measures under consideration. Subject to public feedback.**

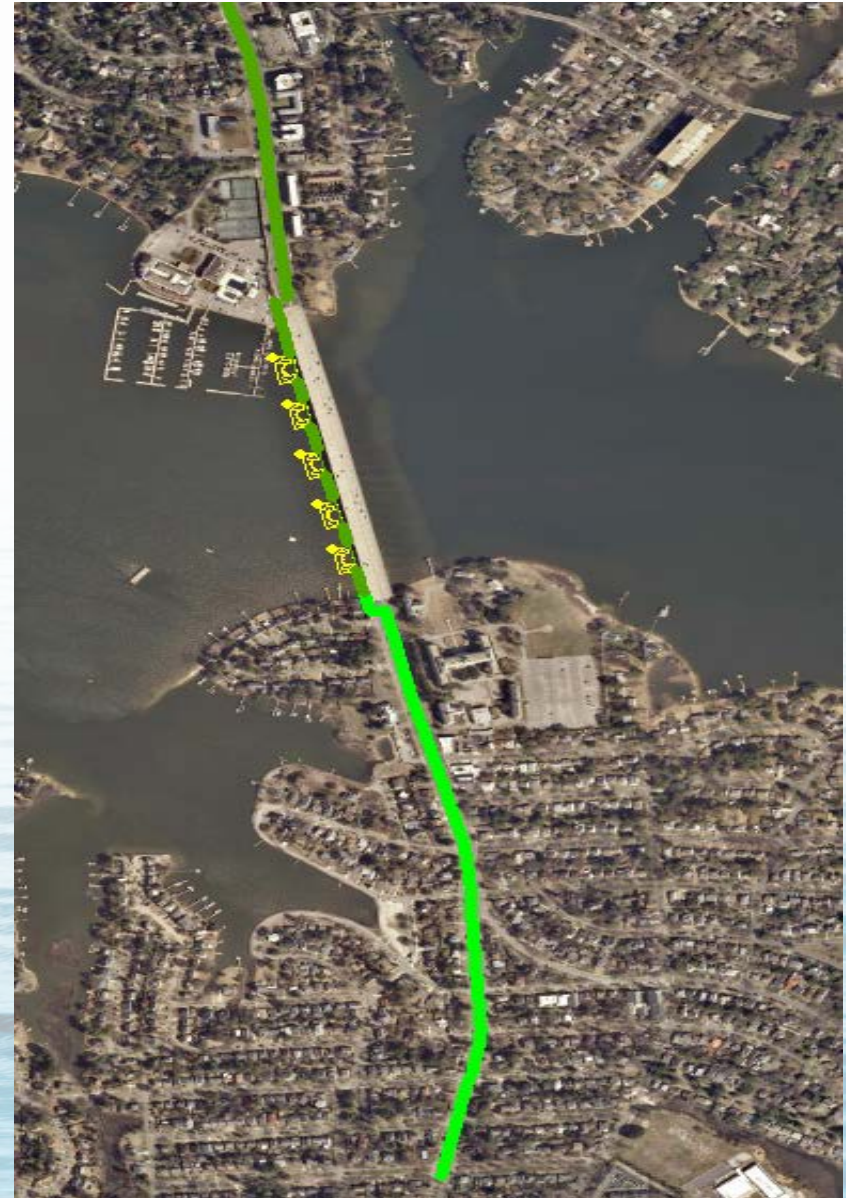


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LAFAYETTE RIVER STORM SURGE BARRIER (3 OF 3)

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***Measures under consideration. Subject to public feedback.**

THE HAGUE (1 OF 2)

NONSTRUCTURAL

- Relocation, acquisition, and real estate elevation.
- Storm water storage improvement and wetlands at Stockley Gardens to mitigate against interior flooding associated with rising coastal tailwater.

STRUCTURAL

- **Option 1:** Storm surge barrier at the Brambleton Road crossing with the Hague. The barrier would include gates, a pump station to evacuate interior drainage, and floodwalls to protect from flanking storm surge and tie into the existing downtown floodwall. This measure plans for floodwalls to protect the Sentara hospital complex.
- **Option 2:** Instead of a storm surge barrier with gates, the barrier would be a floodwall.



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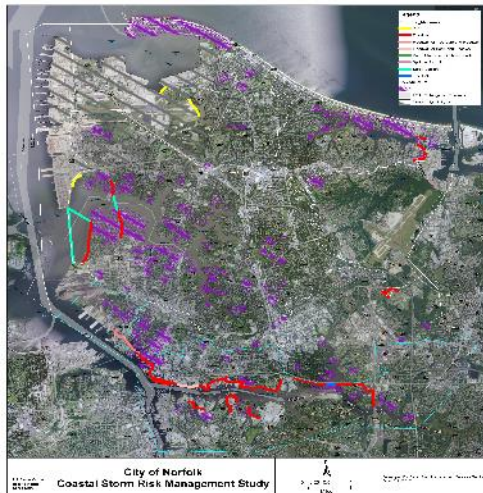
***Measures under consideration. Subject to public feedback.**

Developed by: Paul Van Ken-ghem, Herman Depra
Date: 6/2007

***Measures under consideration. Subject to public feedback.**

DOWNTOWN AND CHESTERFIELD HEIGHTS (1 OF 2)

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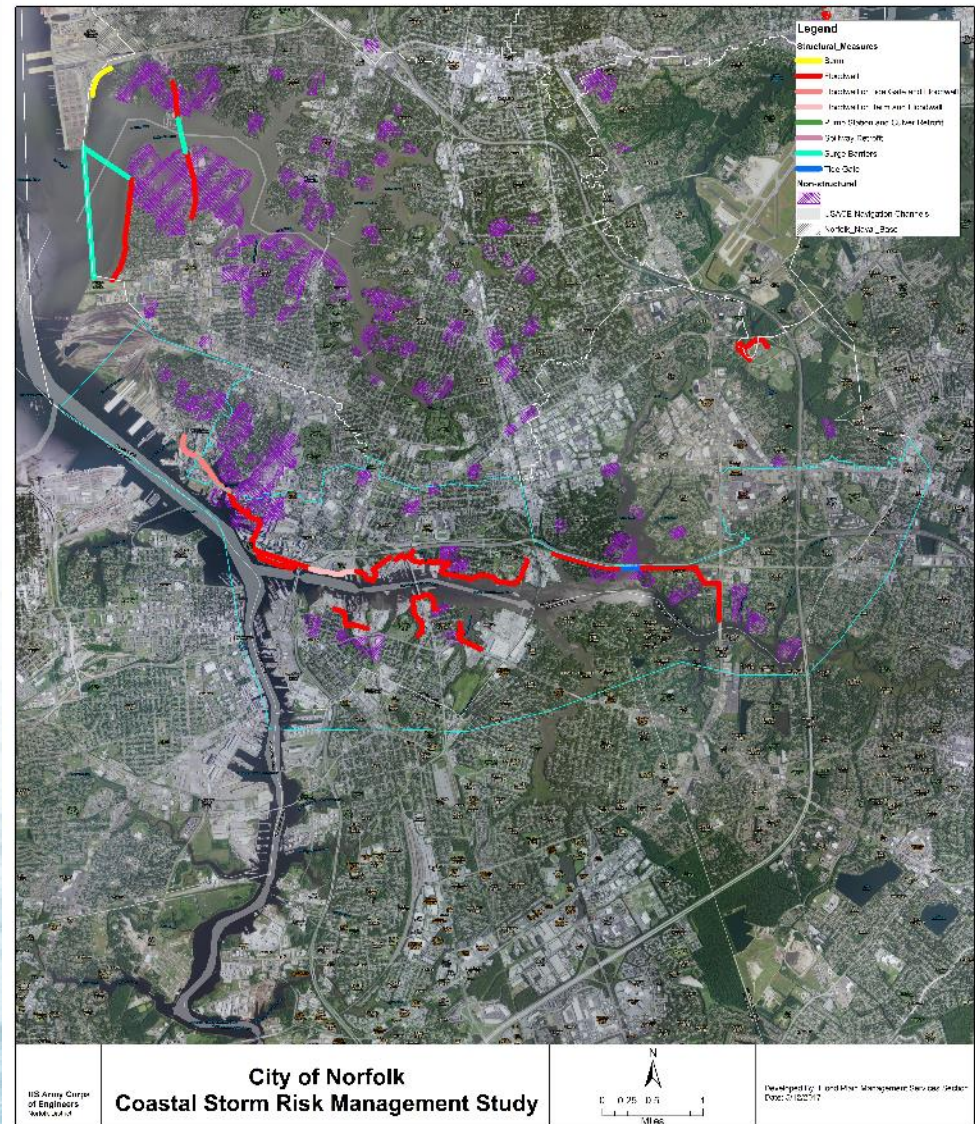


NONSTRUCTURAL

- Real estate raising, acquisition, and relocation. The measure also includes interior improvements to help with stormwater flooding.

STRUCTURAL

- Raise the existing downtown floodwall and add a new floodwall and berm system through Harbor Park and terminating just east of Grandy Village. Pump stations may be needed to evacuate interior drainage.



***Measures under consideration. Subject to public feedback.**

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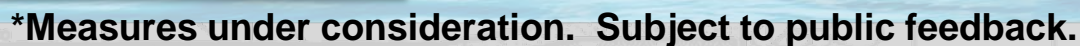




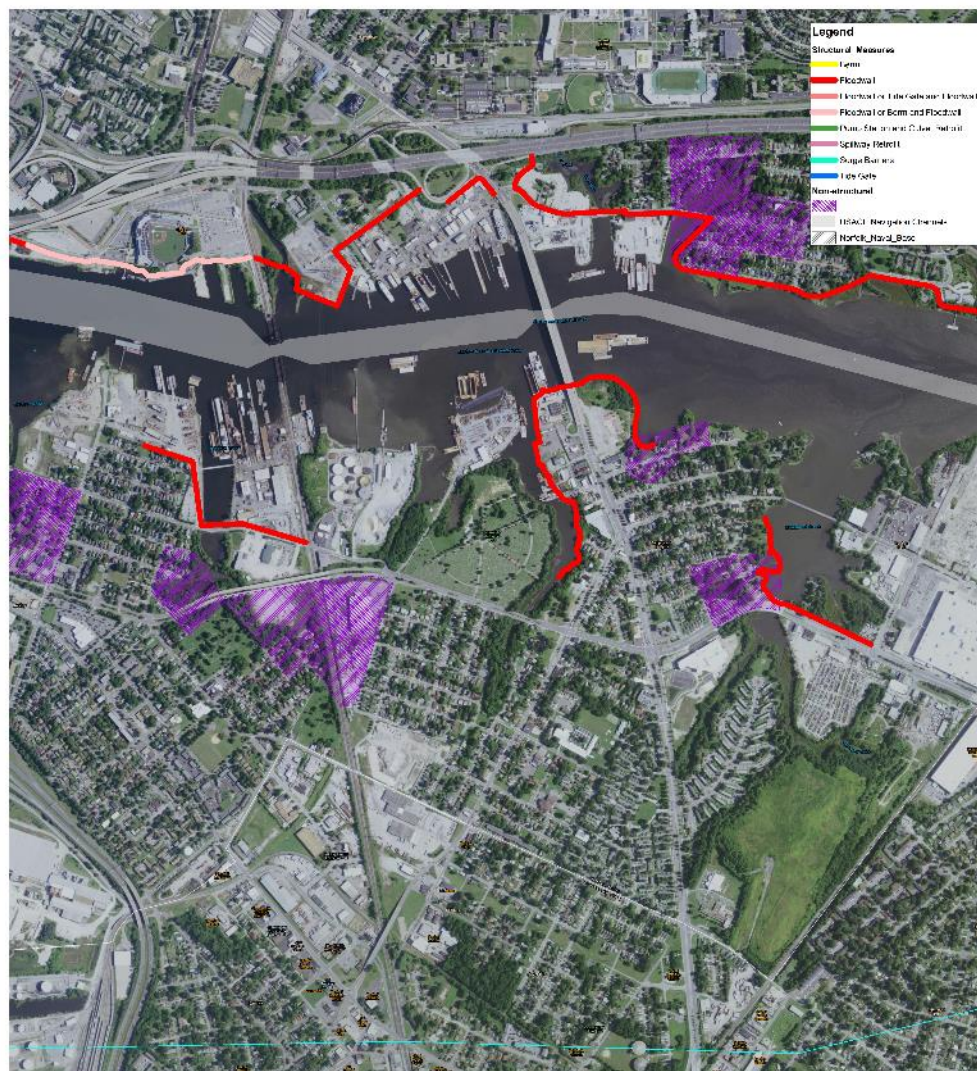
- Real estate raising, acquisition, and relocation.

STRUCTURAL

- Floodwall and berm construction along the coast of the Campostella / Berkley neighborhoods on the southern bank of the Elizabeth River.



CAMPOSTELLA/BERKLEY (2 OF 2)



*Measures under consideration. Subject to public feedback.



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- ## STRUCTURAL

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BROAD CREEK (2 OF 2)

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*Measures under consideration. Subject to public feedback.

MAJOR MILESTONE SCHEDULE

Task	Baseline
Feasibility Cost Sharing Agreement Signed	12 February 2016
Tentatively Selected Plan Milestone	03 August 2017
Release of Draft Integrated Report	03 October 2017
Agency Decision Milestone	06 March 2018
Civil Works Review Board	18 October 2018
Chief's Report	31 January 2019



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QUESTIONS?



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